O-pt-1 (DRG- 1957)

ANNUAL REPORT

CALENDAR YEAR 1957

Division of Research Grants
National Institutes of Health

Annual Report of Activities
Division of Research Grants
Calendar Year 1957

Summary Statement of Extramural Program

Approximately two thirds of the funds appropriated to the National Institutes of Health in fiscal year 1957 supported research in universities, hospitals, and medical schools throughout the country in the form of research grants, teaching grants, health research facilities grants, fellowships, and traineeships. Administrative responsibility for the coordination and management of these programs has been centralized in the Division of Research Grants; thus, it is responsible for the receipt, processing, review and payment of all the previously listed grants and awards.

Through the action of 27 Study Sections and of several ad hoc committees, the Division provides technical review of applications for grants and makes specific recommendations for action to the ten National Advisory Councils. In addition to the foregoing responsibilities, the Division is charged with an equally important function. It is responsible for the support of a significant volume of extramural research, principally in the basic biological and related paramedical sciences, not falling within the categorical responsibility of any of the Institutes.

The magnitude of the current level of financial support administered predominantly by the Division can be seen in the following summary breakdown of research grants and awards approved for payment from fiscal year 1957 funds. A total of 6,186 research grants amounting to $80,906,075 were awarded to individuals in 572 institutions located in 48 States, the District of Columbia, 2 territories, and 23 foreign countries. Research fellowships totaling $5,416,470 were awarded to 2,153 investigators in 202 institutions. These were located in 42 States, the District of Columbia, 1 territory, and 11 foreign countries. Grants to help build or expand 109 research facilities, totaling $29,999,905 were awarded on a matching funds basis to 68 institutions in 30 States and the District of Columbia.

Public recognition of the importance of continued support of medical and biological research as well as research training is reflected in the substantial appropriation made by the Congress for fiscal year 1958. The amount allocated for research grants totals $99,345,000; research fellowships total $6,440,000; and training grants total $32,932,000. In addition, $30,000,000 has been allocated for the Health Research Facilities program, enacted to implement a program for the improvement and expansion of the national health research facilities.

The marked growth of the extramural program is reflected also in the recent reorganization of the Division's administrative components. The variety and complexity of new programs and the rapidly increasing workload have necessitated the change, particularly in view of the need for additional personnel at top management levels. A brief description of each of the Division's newly created branches and the new program developments within these components follows.

Research Training Branch

A Research Training Branch has been established with Dr. Frederick L. Stone, who transferred from the Office of the Director, to become Chief of the Branch. Dr. Stone is also serving as one of two Assistant Chiefs of the Division. This Branch has responsibility for research fellowships, experimental training grants, epidemiology and biometry training grants, and the new basic research training grants program to be described later. This Branch also acts as the focal point of responsibility to provide necessary uniformity in training grant policies, procedures, rules, and forms for the various training programs of the Institutes.

General (Basic Science) Research Training Grants Program

To relieve the acute shortage of trained research personnel in the basic medical and biological disciplines, the Basic Research Training Grants program was initiated in 1957. It is specifically designed to support the basic science training functions in the training Institutions, and to provide additional urgently needed research-trained personnel in such major shortage areas as pathology, pharmacology, genetics, anesthesiology, epidemiology, biometry, biochemistry, physiology, and other fields of the health-related sciences. This training program, responsibility for which has been assigned to the Division of Research Grants, will act as a "feeder" for the categorical Institute training programs, thereby serving to increase their effectiveness within their special areas of responsibility. Grantee institutions receiving funds under the program will select and appoint individuals for predoctoral and postdoctoral training.

Experimental Training Grants

Initiated in fiscal year 1957 and continued in 1958, the Experimental Training Grants program will continue in 1959 at the $500,000 level. The program permitted eight leading medical schools in 1957, and an additional twelve schools in 1958, to test various means of identifying gifted medical students and thereafter giving them special research training while they are still in medical school. It is expected, upon their graduation, that they will provide a valuable pool of research-oriented physicians who will be eligible to undertake full-time academic careers without the necessity of taking additional formal research training.

Epidemiology and Biometry Training Grants

The number of training programs in epidemiology and biometry has more than doubled during calendar year 1957. At the beginning of the year there were 13 programs, one for training epidemiologists and 12 for biometricians. At the close of the year there were 31 programs in these fields, representing an investment of well over a million dollars. Of the 31 programs, 15 are in biometry. The importance of these biometry training grants can hardly be overemphasized at this time of national need for mathematicians and biostatisticians. Nearly every graduate school in our country has one or more unfilled professorial positions available in the area of biometry.

Recognizing the potential for recruitment from the medical and dental school environment, the National Advisory Committee on Epidemiology and Biometry believes that the teaching of epidemiology and biometry in these institutions must be strengthened and utilized to further the objectives of the graduate training program. The Committee is, therefore, contemplating a limited program of an experimental nature in which grants would be made to a few medical and dental schools where adequate fundamental training in epidemiology and biometry already exists, so that they can provide:

a. Organized field or laboratory experience in epidemiology or biometry to postdoctoral (M.D. and D.D.S.) and other graduate students in the medical sciences as a part of already established research and teaching programs at these institutions (e.g. preceptorships, research fellowships, etc.)

b. Additional formal courses to selected medical, dental, and other graduate students in the medical science field.

Senior Research Fellowships

Initiated in calendar year 1956, the Senior Research Fellowship program is now underway to help relieve the shortage of researchers and teachers in the preclinical sciences. Through the medium of special awards, this program is designed to attract many able investigators into the basic science areas. The program is planned to continue through 1959, 1960, and 1961, with \$500,000 increments for each year with the expectation that the \$2,500,000 at the end of the fifth year and thereafter would support annually approximately 250 preclinical science investigators. In fiscal year 1959, a total of \$1,500,000 will be required.

Post-Sophomore Research Fellowship Training Grants Program

~~Also~~ Initiated in the past ~~calendar~~ fiscal year this program, supported by allocations from the research fellowships funds of each Institute, provides support for full-time research training for one, two, or three years of a limited number (average one per medical and dental school) of superior professional students. These students are recommended by their institution, and have had at least one full year of regular professional course work and are willing to drop out of the regular work for one or more years to secure intensive research training early in the span of their professional development.

In general, these fellowships are awarded to candidates at the natural break between their preclinical and clinical course work. This program, for which \$600,000 will be sought from the various Institutes for the third year of operation, appears to have won very high favor as a means of increasing the number of highly competent research workers in areas broadly defined as medical, dental, and related biological research.

Fellowships to Scientists in Other Countries

A modest program of foreign fellowships initiated in fiscal year 1958 will be continued in 1959. These researchers are expected to spend a short orientation period at the National Institutes of Health and the remainder of their year's tenure at an outstanding medical research center in the United States. This program will give these individuals the opportunity to exchange ideas and techniques with outstanding scientists in the United States. This exchange of ideas and modes of technical operation will be mutually beneficial to our scientists and to some of the best European research minds. It will have the further advantage of affording the European scientists a more realistic concept of research as it is conducted in this country. Support for this program will be provided by the various Institutes of the National Institutes of Health.

Evidence of Effectiveness of Research Fellowship Training

Significant evidence of the effectiveness of the research fellowship program has been provided in a recent follow-up study of fellows completing training between 1946 and 1956. Eighty-six percent of these terminated fellows report that they are currently engaged in research. A further analysis of the data in this study reveals that more than half of these individuals also combine teaching activities with research.

Health Research Facilities Branch

The Health Research Facilities Branch will continue to be a part of the Division. This Branch reviews all applications for construction and equipment of health research facilities, presenting such requests to the National Advisory Council for Health Research Facilities for evaluation and recommendation to the Surgeon General. Mr. Francis L. Schmehl continues to function as Chief.

The Program and the Need

The urgent need for a program of the type provided by the Health Research Facilities Act is demonstrated by: (1) the rapidity with which applications were submitted, and (2) the size of the sum requested, which totaled more than $175 million for the first 17 months of operation.

At the end of December, 358 completed applications and 91 supplemental requests had been received by the Health Research Facilities Branch for processing and submission to the Advisory Council. These represent requests of $146,608,822, in Federal funds. Six additional applications were received and later withdrawn.

In addition to the 358 applications and 91 supplementals, 72 notices of intention to file are now on record, indicating a need for an additional $29,722,833. Thus, the known demand for funds now has exceeded $176.3 million. A total of 935 application forms have been distributed in response to specific requests (20 in December). To date, 587 different institutions have requested application forms or information on the program. Since 364 applications (6 later withdrawn) and 91 supplemental requests have been received and 72 intentions are on file, the remaining 408 application forms represent an unknown demand for funds.

On the recommendation of the National Advisory Council on Health Research Facilities, the Surgeon General has approved 251 applications in the amount of $60,000,000, from fiscal years 1957 and 1958 funds. In addition, at the May 27-29 and October 24-26, 1957 meetings, the Advisory Council made recommendations for approval of applications totaling $9,338,427 when fiscal year 1959 funds are available. The Council authorized the Health Research Facilities Branch to arrange for payment of approved projects by fiscal years, in accordance with Council priorities, while at the same time due consideration was given to the need for funds on the part of the applicant institution and its ability to meet all other conditions required to activate the grant.

The Council will meet on January 13-15, 1958, at which time 94 new and deferred applications, in which $32,003,862 is requested, will be reviewed. Approved projects would be subject to the availability of fiscal year 1959 funds.

Variety of Disciplines to Benefit from Grants

The three-year grant program authorizes an appropriation of $30 million each year to build or improve facilities for health related research work in a variety of disciplines. Applications received (up to December 3), have been recommended for awards in the following broad areas of knowledge:

- Medicine
- Dentistry
- Nursing
- Pharmacy
- Public Health
- Veterinary Medicine
- Sanitary Engineering
- Biology
- Psychology
- Chemistry
- Physics
- Biophysics

Legislative Proposals to Implement Program

As a result of the overwhelming demand for financial assistance to accommodate the unmet needs for Health Research Facilities, the Secretary of Health, Education, and Welfare transmitted to the Congress on April 10, 1957, in accordance with the President's recommendations, draft legislation to extend the duration of the program. The proposed legislation is designed also to broaden the program by embracing grants for medical and dental teaching facilities and to increase the aggregate appropriation authorization for the program to $225 million. This proposed legislation is warmly recommended and endorsed by the Advisory Council.

Council Activities

Up to December 31, more than 350 site visits were made by Council members who, it should be pointed out, have full-time positions and who are serving only as per diem consultants to the Government. In the spring of this year, it became apparent that the fourteen Council members would not be able to make all the required site visits. At the request of the Council, the Surgeon General appointed an additional five consultants with particular reference to the representation of psychiatry, sanitary engineering, and hospitals. These consultants give added disciplinary coverage to the original Council representation from medicine, dentistry, biology, psychology, university administration, pharmaceutical manufacturing, and law.

The Council has held five meetings in 1956 and 1957, each lasting three days. A summary of their actions follows:

Number of applications	Sept. 1956	Dec. 1956	Mar. 1957	May 1957	Oct. 1957
[1] Considered	30	129	164	154	125
Approved	7	81	80	88	59
Disapproved	3	13	47	62	58
Deferred	23	86	112	44	41

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[1] Data are not reconcilable because many of the grants considered are partially approved, deferred, and/or disapproved.

Dollar Volume of Applications

CONSIDERED	22,138,891	66,046,507	59,994,455	36,630,918	44,103,862
Recommended	765,159	29,332,100	17,004,992	12,803,264	9,432,912
Disapproved	91,955	5,870,292	15,072,724	7,425,356	16,806,206
Deferred	21,281,777	30,844,115	27,916,739	16,402,298	17,864,744

NOTE: The figures in the preceding table represent the number and dollar volume of applications reviewed at each Council meeting including applications approved in part and deferred in part, supplemental and revised applications, and applications deferred from previous meetings.

Construction Progress Made by Applicants

The urgent need for additional health research facilities is reflected in the progress made by the grantees on the 96 construction projects awarded from fiscal year 1957 funds in the 15 months since the first award was made. As of December 31, nine of the 96 projects have been completed, 20 more are at or well beyond the 75 percent stage of completion, an additional 19 are at or beyond the 50 percent mark, 18 are 25 or more percent complete, 15 others are under contract, and the remaining 15 are in advanced planning stages. Since it generally requires up to a year for planning before contracts can be made, this record of accomplishment is remarkable.

Considerations Involved in Evaluating Applications

1. Institutions with little or no research programs

The most troublesome problem in evaluating individual applications arose in connection with institutions doing little or no research, but which hoped to initiate research programs if an award was made. These applications have come mostly from hospitals and other non-academic institutions. The Council arrived at its decisions, keeping well in mind the statutory requirement that Federal grants are intended for construction that will "expand the applicant's capacity for research...or...improve or maintain the quality" of such research. Awards were made only where there was reasonable assurance that a grant would really achieve the purpose of the Act.

2. Separation of research facilities from educational facilities

Another difficulty faced by the Council in evaluating applications arose in the differentation of research facilities from educational facilities. One medical school, for example, pointed out that a large laboratory of pharmacology to be built would be used four months in the year for teaching medical students and eight months as a research laboratory. Several schools included a library in their plans in their justifiable belief that a medical school library is used more often by research personnel than by students seeking educational literature. In all instances, grants have been awarded only for the portions of the construction costs for facilities used exclusively for research, as provided in the Act.

As stated previously, the Council remains convinced that future expansion of health research facilities to improve the health of the American people can have maximum impact only if accompanied by a program for construction of facilities for the training of research personnel.

3. Separation of research facilities from health care facilities

Another difficult problem has been the evaluation of those applications requesting special facilities related to health care. If it was evident that the health care work would eventuate in research, this aspect of the proposal was given particular attention. Applications for assistance in the purchase of hospital beds, diagnostic laboratories, and other services were recommended for disapproval despite the fact that these facilities can serve research needs. This was done to prevent confusion and overlapping of program objectives with respect to the objectives embodied in the "Hill-Burton" Act -- namely, Federal assistance in the expansion of hospital facilities.

4. Basic equipment vs. special equipment for specific research projects

It is the intent of Congress to provide facilities for research that are basic and lasting for at least 10 years. An approach was therefore determined that would recognize the difference between the equipment basic to the need in broad areas of research and the special equipment needed for specific research projects. Thus, a policy for approval of grants for equipment was made on the basis of square feet of net research space to be outfitted.

The Council applied two figures in its formulation; one for totally new space and another, carrying somewhat less weight, for space representing expansion or renovation. This plan carries out the letter and intent of the Act, not to interfere in research programs; yet, it permits freedom of equipment selection (having five year life) by the applicant and not by the Surgeon General and the Council.

In making awards for equipment, many recommendations were made for approval from anticipated future appropriations. The reason for this was a desire to effectuate to the maximum the desire of Congress to "expand the applicant's capacity for research..." Clearly this could best be done if the concentration were on new buildings in the first year and on equipment in a future year when the buildings would be completed and ready for furnishings. A policy of simultaneous allocation for building and equipment would have resulted in a significant delay in starting some buildings.

In a few instances, grants for equipment were recommended for institutions which had completed laboratories but lacked equipment, or which had buildings under contract or construction and hence were ineligible for a construction grant. This category included 11 recommended grants totaling $821,957.

5. Size of grants in relation to the potential of the research program

In view of the funds authorized and the large volume of applications submitted, particular attention was given to determination of the appropriate amount to be awarded for each approved application. The availability of certain data enabled the Council and staff to arrive at a formulation which determined the average amount of research space required for each researcher in the proposed project. In general, grants were made for present needs for potential expansion only in the immediate future. While this resulted in reduced awards in most instances, no rigid rule of reduction was applied.

6. Policy of noninterference in program

In all recommendations for awards in reduced amount, care was taken to make clear that the Surgeon General and the Council were not dictating to the applicant what to build, but only indicating to what extent and for what facilities funds were recommended for participation up to the legal 50 percent. Applicants were informed explicitly that they were free to build whatever and however they desired provided that the building included the specific facilities for which an award was made.

For example, if an applicant were building a special research facility in a distinctive architecture which added significantly to the cost as compared to the average cost of this type of facility, the Council would recommend a grant for the square footage requested but at a reduced cost per square foot, with the statement that if the institution wished to build in the distinctive and costly architecture it could provide the difference.

Geographic Distribution

It is the intent of the Health Research Facilities Act that the Nation's health research facilities be expanded through "an equitable geographic distribution." Accordingly, the Nation has been divided into four regions, each with about equal population and an equal number of medical schools. Region I, the Northeast, includes New York, New Jersey, and Pennsylvania. Region II is the South, Region III is the Midwest, and Region IV is the Far West.

In the recommendations for approval during the first year, it was possible to allocate the funds almost equally.

Region	Allocation
I	$7,768,469
II	7,035,052
III	7,818,709
IV	7,377,675

In the following year, equal allocation was not possible, not because the Surgeon General and the Council did not wish it, but because the number of applications and the dollar volumes requested were unequal. As of December 31, 1957, the distribution of all recommended grants was as follows:

Region	Total Requested	Allocation	% Allocated
I	$52,989,398	$18,444,456	35%
II	13,441,955	9,181,543	68%
III	36,940,432	17,601,682	48%
IV	29,097,919	14,772,319	51%

In the final allocations during the third year of the program, it is the intent of the Council to preserve as equal a distribution as possible.

Future Planning

An appraisal of the entire program by the Council and staff in light of the applications received and subsequent discussions with the administrators and investigators of a variety of research institutions has pointed up three areas of concern: (1) the importance of basic research; (2) the need for health related research facilities over and beyond the present authorization; and (3) the great need for facilities necessary for educational training of health personnel.

It has been noted previously that few grants were made to colleges. Research at this level has contributed substantially to furthering the knowledge in those health related disciplines that ultimately pave the way for advances in the Nation's health. In many colleges, the present buildings were built in the early part of the century with little or no provision for research space. To provide modern research facilities for these institutions, extension of the authorization of this program is recommended by the Council and staff for additional years.

Since the Health Research Facilities Act requires a yearly appraisal of the ability of the current program to meet the long-term need for funds to achieve its objectives, a detailed annual report of this nature will be submitted by the Surgeon General to the Congress in early 1958. In order to give a sound estimate of future needs for support, the following items will be included in the Second Annual Report:

	Amount	Cumulative Total
1. Grants recommended at previous meetings, approved by the Surgeon General, and applicant notified.	$60,000,000	
2. Grants recommended by Council at meetings prior to January 1958 meeting but not yet approved by the Surgeon General.	9,338,427	$69,338,427
3. Estimate of grants to be recommended by the Council at the January 1958 meeting from applications totaling $33,197,101. (52% approval rate based on experience.)	17,262,492	86,600,919
4. Estimate of grants to be recommended by the Council upon review of applications received prior to June 30, 1958. (Based on letters of intent and other applications meeting deadline.)	30,000,000	116,600,919
5. Estimate of additional health research facilities needs. (Estimate of staff and Council in consideration of 400 sets of applications requested by institutions which have not yet filed requests.)	35,000,000	151,600,920
Total authorization of present legislation		-$ 90,000,000
Estimated immediate deficiency		$ 61,600,920

The Act provides that all applications received before June 30, 1958, must be considered and it is more than possible that additional applications will be made. It is clear that the present Act is inadequate to meet the essential long-term needs of the Nation. This is another reason for the recommended extension of the authorization for additional years.

Grants Review Branch

The Grants Review Branch is comprised of 27 Study Sections. Dr. Clifton K. Himmelsbach serves as Chief of this Branch, assisting the Executive Secretaries of the Study Sections in the discharge of their duties and being responsible for overall management of the Branch.

New Procedure for Review of Multidisciplinary Research Grant Applications

Whereas most of our research grants are unidisciplinary in concept and execution, now and then the Branch gets a request for support of research involving two or more disciplines. Of these, some are of sufficient magnitude and complexity as to deserve special handling. Previously, these have been reviewed mainly by Councils and/or special committees thereof. In view of the likelihood of an increase in this kind of research grant application, and in view of the desirability of preserving the double review system and adapting it to meet this need, it was proposed that the Division of Research Grants set up a special mechanism for this purpose.

Multidisciplinary review and appraisal will now be accomplished by convening an *ad hoc* Special Study Section to conduct a group--on site--review and appraisal of the proposal and to develop recommendations to be presented to the Council(s) concerned. The techniques employed will have to be worked out in relation to the issues presented by the application under study. At this time, however, the following guidelines have met with general approval:

1. The Chief, Grants Review Branch, and the Project Review Officer will recommend, and the Chief, Division of Research Grants, will designate those projects to be so reviewed.

2. The Grants Branch Chief(s) involved will be advised and given an opportunity to offer suggestions.

3. An Executive Secretary will be designated to do the staff work involved.

4. A Study Section will be assembled consisting of a group of experienced scientists considered able to deal effectively with both the individual disciplinary aspects of the research, and with the interdisciplinary and collective aspects as well. (In assembling this group, preference will be given to experienced, former Study Section members who have demonstrated good judgment of the scientific problems in their own respective fields, the ability to consider their fields in relation to other fields, and the ability to work effectively in a multidisciplinary group. The Chairman shall, in addition, possess those qualities of leadership required in achieving optimum group functioning.)

5. The review and appraisal per se will be accomplished by means of an arranged group project-site visit. The Study Section will convene at a hotel in the project city, and following orientation and review of the proposal, will plan the details of the visit per se. In execution, the visit should start off with a joint

meeting of the visitors and those being visited for purposes of general orientation as to the purposes and methods of the research proposal. Following this, each of the Study Section members will work with his opposite number (the investigator(s) planning to work in that visitor's specialty area) to consider the scientific merit of that part of the proposal, the ability of the investigator, the adequacy of the facilities and material, and the realism of the budget. In addition, each visitor will explore, especially carefully, those areas of interaction or requisite interdependence involving his specialty and others concerned in the project. Arrangements will be made whereby the visitors may meet alone as needed during the course of the visit to compare observations. Whenever interdisciplinary problems or serious questions are encountered or suspected, the Study Section Chairman will call a conference of all parties concerned for the purpose of exploring the possibilities of resolution or clarification. Following the reconnaissance phase of the visit, a brief terminal joint conference will be held at which any general over-all unresolved questions may be discussed.

6. Finally, the visitors will return to their hotel conference room, present their individual final reports and recommendations, and arrive at an over-all appraisal and group recommendations to transmit to the Advisory Council(s) concerned.

7. The Chairman and members of the Study Section will receive the usual reimbursement for travel, the standard per diem allowance, and the $45 per day consultant fee.

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Special activities undertaken by most Study Sections during the past year may be summarized as follows:

Biochemistry Study Section

The Biochemistry Study Section has continued throughout 1957 its interest in, and endorsements of, the activities of the Committee on Biological Chemistry of the National Research Council. This Committee was launched in 1955, through the joint efforts of the Biochemistry Study Section, the American Association of Biological Chemists, and the Biological Division of the American Chemical Society, to explore the need for, and to formulate and promulgate means of assuring qualitative improvements of commercially available chemicals and materials required by investigators in modern biochemical research. The Committee has developed the criteria and specified the characteristics of commercially available research material on about 85 biochemical compounds and preparations. Through its sub-committees, it has established a fine rapport with the more ethical manufacturers and vendors of biochemicals, and has distributed to them its suggested biochemical standards. This continuing program will have inestimable value to the research fraternity by reducing the numbers of meaningless or uninterpretable reports resulting from data obtained with impure and unreliable biochemicals.

The Study Section actively supported and participated with the Federation of American Societies for Experimental Biology in the selection of applicants and the development of a fund. The latter provided a source of travel grants which enabled 22 research biochemists in the United States to attend the International Enzyme Symposium in Tokyo in October 1957.

The Biochemistry Study Section is collaborating with the American Association of Biological Chemists in the development of a fund from which travel assistance will be provided to enable younger biochemists to attend the International Biochemical Congress in Vienna in September 1958.

Biophysics and Biophysical Chemistry Study Section

The Biophysics and Biophysical Chemistry Study Section is engaged in a variety of activities to help provide training on a national scale, in the broad field of biophysics and biophysical chemistry.

A number of sizable grants have made possible training opportunities for graduate students. For example, a five-year grant, made to the Biophysics Department of Johns Hopkins University, provides a modern electron microscope and also an X-ray diffraction unit, plus properly trained personnel to use this equipment.

As is the case with most applications considered by this Study Section, a project-site visit was made by a member of the Section. In the case of a visit to Johns Hopkins, a Study Section member told the head of the Biophysics Department about the possibility of obtaining funds for the construction of research facilities. As a result, he submitted an application for a grant to add two floors to the existing one-story biophysics building. This request is still pending. Thus, opportunities for the training of graduate and post doctoral students in a leading center of physical biology are considerably expanded.

The Study Section also has used the research grant device to help solve a critical manpower shortage in the area of biophysics. It has recommended funds, in the form of supplements to existing Public Health Service grants, which enabled leading biophysicists to attract promising undergraduates into their laboratories. Approximately twenty such supplements were awarded recently, each providing funds for one or two graduate students and averaging about $8,000 yearly. It is planned to continue this program on a limited basis as opportunities for getting competent investigators are presented.

In order to function most effectively and to have a broad picture of what is going on in biophysics in the United States, the Study Section sponsored three regional conferences recently. Leading teachers and investigators informed members of the Section of the training and the research programs being conducted in their laboratories and institutions. A great many problems were discussed and ideas were freely exchanged. The Study Section made a particular point of advising the conferees about the NIH policies with regard to providing support for training. Similarly, this information was given to approximately 500 biophysicists who attended the first National Biophysics Conference in Columbus, Ohio, in March 1957.

Recently, visits were made to certain universities which had heard of the Section's programming activities and had made special requests for a visit in order to obtain our advice on pressing problems which required expert and immediate consideration. One such trip was made to the University of Buffalo which is actively engaged in the process of establishing a Department of Medical Physics in the Medical School. Following the example of Sweden, the University of Buffalo will include medical physics in the curriculum of its medical students and will stress radiation physical biology. To aid the University of Buffalo in learning more about the field and to provide them with an opportunity for interviewing potential candidates for the position of health of the new Department, the Study Section made a special grant of $2,500 to the University. The grant will be used chiefly to support a series of seminars given by outside authorities and it is hoped that one of these lecturers will find opportunities at this institution sufficiently challenging and rewarding to accept the new position being offered. In addition to this special grant, two additional biophysicists at the University of Buffalo were given support by the Study Section.

The Study Section has also initiated and supported a number of other important catalytic activities to help the field of biophysics. It is currently finishing the compilation of a national roster of biophysicists. The Section has sponsored a year's study of plans to create national or regional instrumentation centers where complete collections of the most modern instruments would be assembled for the purpose of training physical biologists in the theory and practice of modern complicated apparatus.

Two special traveling fellowships were awarded by the Study Section to provide specialized training in outstanding laboratories to outstanding young biophysicists. This type of fellowship has liberal benefits since it allows the advanced student to study at various laboratories, including foreign ones, according to his own interests. Another special fellowship was awarded this summer to an unusually gifted young physicist who showed keen interest in medical research. Other such fellowships will be given by the Section as attention is called to promising young talent. The Study Section is especially interested in attracting the best young minds, trained in physics, physical chemistry, and mathematics, to the challenge of biological and medical research, training, and teaching.

Special attention should be called to the graduate training grant which has been found to be exceedingly useful to the Study Section in its programming activities. Lack of adequate funds has limited the Section's use of this type of grant. In the past year, the Section approved three training grants to three different laboratories engaged in biophysical activities; the amounts recommended approximated $200,000 yearly. Several times this amount will be necessary to meet the needs of this rapidly accelerating program.

The Study Section has also been engaged in a number of other important catalytic functions which will be mentioned only briefly. The Section sponsored in May a conference on nuclear and paramagnetic resonance. This new physical tool is proving to be most helpful in the study of cellular function and structure at the molecular level. Likewise, the Study Section is taking active steps to nourish X-ray crystallography. This technique is critically important in the determination of the precise three-dimensional architecture of molecules of biological importance, proteins, for example. It is probable that the answers to many of the disease processes depend upon this type of specific information.

Immediate and urgent attention is being paid to the re-training of leading physicists who are becoming increasingly interested in the challenge of biological and medical problems. The Section believes that it is of cardinal importance to attract this type of mind to medical research, as well as the training of brilliant young biophysicists.

Along these lines, the Study Section is planning to sponsor an intensive session covering the whole field of biophysics and biophysical chemistry. During the four-week period of July 21 - August 15, 1958, it is planned to have as speakers and teachers the most competent experts available, approximately thirty in number. The invitees will be physicists, physical chemists, biophysicists including radiation biologists, mathematicians, biologists, etc. The Study Section is confident that the expected interplay of ideas will have a profound impact on the entire field of biophysics and that this meeting may very well become a yearly event of great significance.

Human Embryology and Development Study Section

The Human Embryology and Development Study Section sponsored jointly with the Association for the Aid of Crippled Children, a Second Symposium on Teratology. The meeting was held on April 15 and 16, 1957, in Wilson Hall, Building 1, National Institutes of Health. Eight-eight people attended the meeting. Twelve papers were presented, which were followed by discussion.

The papers presented at the First Teratology Conference held on January 12 and 13, 1956, at the Children's Hospital Research Foundation, Cincinnati, and also sponsored jointly by the Human Embryology and Development Study Section and the Association for the Aid of Crippled Children, were published as a supplement to the April 1957 issue of PEDIATRICS. Copies of the supplement were made available to members of Study Sections and Councils, to grantees and other workers in the field of human embryology.

As the result of many misconceptions reflected in the applications dealing with pregnancy wastage, as to the type of research needed, it was decided to scrutinize basic problems more closely. Hence, the Study Section felt that a "Conference on Epidemiologic Aspects of Pregnancy Wastage " would be timely. Such a meeting would enable the Study Section to make specific recommendations on applications dealing with these problems. In addition, it would provide guidance to workers in the field of human embryology and development. At the last meeting of the Study Section, a sub-committee was appointed to organize this conference.

The conference is scheduled to be held on March 24-25, 1958, in the Arden House, Harriman, New York and attendance will be limited to about 50. This will include members of the Study Section, invited guests in the field of epidemiology and the leaders of the participating groups in the Collaborative Studies on Cerebral Palsy, which is sponsored by the National Institutes of Neurological Diseases and Blindness.

Morphology and Genetics Study Section

The special activities of the Morphology and Genetics Study Section for the last year can be broken down into three categories:

1. Stimulation of research in the area of human genetics.
2. Stimulation of research in the area of cell biology.
3. Organization of a symposium aimed at reconciliation of the divergent viewpoints held by morphologists, physiologists, biochemists, and biophysicists regarding the cellular mechanisms of membrane permeability and active transfer of materials within the cell.

Human Genetics: Approximately two years ago the geneticists on the Morphology and Genetics Study Section decided to stimulate interest in this area of research with particular regard to medical schools. Section members on their own initiative encouraged a few investigators to submit several applications, but it was recognized that such individual efforts lacked coherence and could not furnish the necessary long-term impetus. Therefore, it was decided to select a university possessing the broadest genetic research facilities, and attempt to involve it in some promotional activity such as a summer training course. With this in mind the University of Wisconsin was selected as being pre-eminent in the field of genetics.

Through the efforts of Study Section members as well as the Executive Secretary, a symposium entitled, "A Symposium on Genetics in Medical Research," will be held April 7-10, 1958. An invitation is being extended to each medical school in the country to send one representative who would be most interested in furthering medical genetics. If the results appear satisfactory to everyone concerned, then some thought may be given to the possibility of establishing a more permanent type of summer training activity.

As already mentioned, several research applications to support laboratories of human genetics research in medical schools have been received. As a specific example, one might mention the case at Washington University at Seattle. Following preliminary discussions with the Executive Secretary, Dr. Yeager, and Dr. Stewart, Assistant Director of the Heart Institute, Dr. Robert H. Williams, Chief, Department of Medicine, proposed to establish a section of human genetics within his department that would also have close ties with the Department of Preventive Medicine. The outcome of these discussions, after a project site visit by the Study Section and the Heart Council, lead to the support of Dr. Arno Motulsky under grant number H-3091.

One more incident might be mentioned. On September 24, 1957, the Executive Secretary attended a conference in the office of Commissioner Leona Baumgartner at the Department of Health in New York City. This was a meeting instigated by local research people to see if the vital statistic records of the Department could be utilized in establishing a registry of human twins.

Human twins, particularly idential twins, are of great importance to the study of human genetics because they serve as our only good method of control in distinguishing between environmental effects and inherited effects. Identical twins that happen to be separated at an early age and raised in different environments serve as almost ideal controls in the true experimental sense. One of the great difficulties facing the establishment of such a registry is the matter of distinguishing between homozygous twins (both derived from the same egg) and heterozygous twins (those derived from two different eggs fertilized at the same time.) Similar sex and similar appearance are not satisfactory criteria. Perhaps the best criteria to date are based on the comparison of a complex of blood antigen reactions. This is an expensive procedure that requires special technicians and cannot be entrusted to the average hospital laboratory. A ray of hope can be seen in a recent application (RG-5533) received from the National Research Council for support to establish a twin registry using the records of the Veterans Administration. One of the biostatisticians at the National Research Council in cooperation with the FBI has worked out what appears to be a valid test of homozygosity based upon an analysis of the finger print whorls. If this is confirmed by blood group analysis, then it can lead to the immediate establishment of a United States wide registry based upon a check of existing finger prints. It is true that the NRC registry would have limitation of applying to a selected group of males (i.e., veterans), yet it would serve a useful purpose.

Cell Biology: Many members of the Morphology and Genetics Study Section believe that the general area of cellular biology in recent years has not received the type of support that will encourage truly basic research. In brief, it is felt that project type grants result in short-term, quick-result experiments that lend themselves readily to annual reports and a steady stream of publications. The effort to maintain a constant stream of concrete projects discourages the more leisurely, thoughtful and hunch-playing type of research that opens up new areas of basic research.

What the Study Section is now undertaking can be stated as follows: Dr. Keith Porter, who has now retired from Study Section activities, is being retained as an emeritus member so that he can be traveled to various institutions to stimulate application for support of "A Program of Research at Laboratory of Cell Biology at -- University." Dr. Porter is now visiting selected schools to encourage established investigators to apply in a group fashion. It is hoped that this effort will have the following benefits: (1) each man within the group will have the stimulation provided by other investigators having similar interests; (2) since support will be evaluated in terms of the overall effort of the group, each man will not stand or fall because of the exigencies of his reported research for that year; and (3) also, it is visualized that there will be less paper work involved in ratio to the amount of money given in support. This would undoubtedly be welcome by both the investigator and the granting agency.

Symposium on Cellular Transport Mechanisms: The Study Section has under consideration the sponsorship of a symposium which has originated largely as the brainchild of Dr. Stanley Bennett, partly on the basis of his knowledge of the field, partly on the basis of correspondence, and partly on the basis of conversations held at the International Congress of Cell Biology at Glasgow, September, 1957. He has been motivated by the fact that the more classical physiologists and the recent, heretical generation of electron microscopists do not have common interpretations of the cellular transport mechanisms. If support is obtained, it is visualized that the symposium would be held in late 1958 or early 1959.

Pathology Study Section

The College of American Pathologists at its meeting in New Orleans in 1957, had a three-day workshop participated in by the Chairman of the Academic and Hospital Departments of Pathology throughout the country. The purpose was to define better the research and research training needs in Pathology and to alert the members of the College to the ways and means of securing such support. Dr. Frederick L. Stone and Dr. Eli Nadel, by invitation, represented the interest of the Division of Research Grants and the Public Health Service. Dr. Stone discussed the newly developed General Research Training Program and the Fellowships Program. Dr. Nadel took part in the three-day round table discussions.

During the past year the functions of the *ad hoc* committee on Increasing Research Potential in Pathology were absorbed and merged with the functions of the Intersociety Committee for Increasing Research Potential in Pathology, Inc. With the dissolution of the *ad hoc* committee as a grant receiving group and its merger with the Intersociety Committee, the Pathology Study Section formed a Pathology Advisory Group to deal with the program interests of the Pathology Study Section. These interests are apart from the regular duties of the Study Section in reviewing research grants.

A conference on the establishment of nomenclature for the proper description of atherosclerotic lesions on a world wide basis was the subject of a six-day conference sponsored by the World Health Organization, Pan American Sanitary Bureau, and the National Heart Institute under the leadership of Dr. Samuel Middleton (PASB), and Dr. Jerome Peterson (WHO) and was participated in by Pathologists from Europe, Asia, Africa, South America, Canada, United States, and Great Britain. Dr. Stewart (National Cancer Institute) and Dr. Nadel (DRG) participated as consultants and Dr. J. F. A. McManus (Alabama) represented the Pathology Study Section.

Dr. Kinney (Western Reserve) has completed plans for the Conference on Nutritional Pathology that will be held at the Princeton Inn on June 1, 2, 3, 4, 1958. This will be jointly sponsored by Pathology Study Section, the National Heart Institute, the Food and Agriculture Organization, and the World Health Organization.

Another Study Section member, Dr. J. F. A. McManus (Alabama), has completed plans for a Conference on Cellular and Molecular Pathology to be held in Madison, Wisconsin on August 20, 21, 22, 1958.

The newly developed General Research Training Program has had 14 hopeful applicants from Departments of Pathology. Final action on these are dependent upon the Health Council which meets on March 3, 1958.

A meeting amoung Departmental Chairmen in Pathology to discuss the relationship of nuclear energy to experimental pathology is planned for February 6-7, 1958 at Brookhaven. Various members of the Study Section are expected to participate in the discussions.

Pharmacology and Experimental Therapeutics Study Section

In 1957, the Pharmacology and Experimental Therapeutics Study Section discussed the special training needs in the field of pharmacology to relieve the chronic shortage of scientists trained in this area. It recommended that the various departments of pharmacology be encouraged to use training and research grants to train recruits in pharmacology.

This Study Section felt it would be remiss in its obligation to the Government and its fellow scientists if it did not call attention to the rapid advances in the research on catechol amines. Because these advances have not been integrated and because seemingly conflicting results are clouding the understanding and clinical significance of these amines, this Study Section is planning a symposium on this subject in the fall of 1958.

The symposium will be restricted to those amines of biogenous origin, especially adrenaline and noradrenaline. Chemically, catechol amines are amines of orthodihydroxy benzene.

Adrenalin and noradrenaline are hormones produced by the adrenal gland. The typical action of adrenalin (epinephrine) consists in a highly specific stimulation of the receptive mechanism of the entire sympathetic system. Its effects upon a given organ, whether stimulatory, inhibitory, or indifferent, correspond to the effects of stimulation of its sympathetic innervation. Among the more obvious effects are an increase in blood pressure, increase in heart rate, dilatation of the bronchi. It is used in the treatment of allergies, and of asthma, as a mucosal decongestant, and as a local antihemorrhagic agent.

Noradrenaline (norepinephrine, arterenol) is a demethylated adrenaline. It acts similarly to adrenalin qualitatively but with different potencies on different functions.

At present, there are two methods for the analytical determination of these amines in biological media. Each of these methods has received wide acceptance, and each has been modified, sometimes at the whim of the individual. Unfortunately, these clinical methods are being used freely without a sound knowledge of their limitation. In fact, some hospitals and clinical laboratories have expressed the intent of setting up routine laboratories for the detection of catechol amines in tissue. To help clear up the confusion which accompanies the indiscriminate use of methods and the injudicious collection of data, the symposium will provide a critical review of this area.

Radiation Study Section

Cooperative Studies of Radiation Therapy: While radiation therapy has long been conducted traditionally on an empirical basis, the science of radiobiology has made progress in its effort to elucidate the mechanisms of action of ionizing radiation on tissue. It seemed to the Radiation Study Section that the time had come to bring the art and the science together and give each an opportunity to better understand the other and to work together with mutual profit. Accordingly, the Radiation Study Section and the National Research Council sponsored a Conference on Research and Radiology at the Hotel Moraine, Highland Park, Illinois, May 10-12, 1957. At the conference, attended by this country's prominent radiobiologists and radiation therapists, agreement was reached that much is to be gained by closer coordination of these disciplines, and that there was clear indication for careful scrutiny of the results of radiation therapy. The discussions pointed out that it would be impossible for individuals to establish unequivocally that any one form of radiation therapy had advantages over another. Consequently, it was concluded that the best way to effectuate a transition of this art into a science was to form a basis for cooperative studies of the values of various forms of radiation therapy. Committees were established to pursue the subject.

A number of the participants in the original conference convened in Quebec during the course of a meeting of the American Radium Society, May 29 - June 1, 1957, for further exploration of the subject. At that time, it was concluded that it would be essential to standardize dosimetry throughout the Cooperative Study Group, and that it would be important to select discrete tumor sites as objects of investigation. Recognition was taken of the essentiality of employing biometrically sound principles in the conduct of such studies.

The next conference was held at the Stone House, National Institutes of Health, in Bethesda, July 27-28, 1957, at which time clearer recognition of the essentiality of the biometrically sound protocol was adduced, and, on the basis of study by "long range" and "short range" committees, several tumor sites were selected for consideration as protocol test objects. Committees were appointed to investigate the feasibility of investigations of the effects of radiation therapy against: glioblastoma multiforme, cancer of the lung, cancer of the cervix, cancer of the urinary bladder, cancer of the pharynx-larynx, and cancer of the testis. Uniform data concerning the availability of clinical material was to be secured by a questionnaire.

A questionnaire was developed, approved by the Bureau of the Budget, and sent to prominent radiation therapy centers throughout the U.S.A. These results became available to the committees for review and a meeting was called to consider resultant protocol committee recommendations in Chicago, November 17-18, 1957. On the basis of these deliberations, it was decided that cooperative studies could yield biometrically sound results and that the best test objects at the outset would be carcinoma of the lung and cancer of the cervix. A Cooperative Radiation Therapy Service Center was selected (Stanford University), and plans were laid for the development of definitive protocols to be considered, and hopefully agreed to by potential participants, at a conference to be held at the Stone House, National Institutes of Health, Bethesda, March 17-18-19, 1958.

Meanwhile, as a result of the deliberations, the Study Section developed a position on radiation therapy which, in essence, recommended the fostering and the development of radiation therapy centers affording adequate facilities for training, the conduct of research in fundamental and clinical problems, and the provision of service to population groups of about 3 million.

Adverse Side Reactions due to Standard Diagnostic X-ray Procedures: Early in calendar year 1957, this country became highly conscious of the fact that the side or stray effects of standard diagnostic X-ray procedures were cumulative and harmful. The Radiation Study Section considered it important to invite the attention of the medical profession to this hazard, and to invite its cooperation in reducing the unnecessary dosage through education and improved techniques. Consequently, a conference was held at the Princeton Inn, Princeton, New Jersey, May 25-26, 1957, to which were invited representatives of outstanding medical organizations of the United States of America. The evidence available at that time was presented to them in a clear and succinct fashion. It was the consensus of the group that no "crash" program was necessary or desirable, and that the "profession" had the responsibility of correcting procedural defects. The Public Health Service was urged to make biometric and biostatistical assistance available to those involved in the conduct of studies on adverse side reactions involved in diagnostic radiation procedures; the American College of Radiology was urged to undertake a program of education of all concerned on the hazards involved in diagnostic radiation procedures and how they might be avoided; the National Committee on Radiation Protection was urged to bring its handbook No. 60 up to date; the American College of Radiology was urged to bring the preparation of its manual on Radiation Protection up to date and to distribute it widely.

Adverse Side Reactions Due to Clinical Utilization of Iodine: I^{131} is used in the clinical management of hyperthyroidism, angina pectoris, and cancer of the thyroid. There is a wide special range in dosage used for these three conditions. Leukemia is known to have occurred following its use in thyroid cancer; few cases have been observed in patients who have been treated for hyperthyroidism. In view of these occurrences, the Radiation Study Section considered it appropriate to consider the advisability of sponsoring follow-up studies of patients treated with I^{131} for these three conditions. Preliminary inquiries revealed that this would be a formidable undertaking. To gain significant positive or negative results, statistically speaking, it would be necessary to contact more patients than have been treated, unless the incidence of these adverse side reactions far exceeds the current estimates. In order to come to a definitive position as to whether or not to undertake the study, the Study Section will seek from cognizant physicians clearer ideas as to the numbers of patients treated, the adequacy of follow-up, and the incidence of adverse side reactions so far noted among I^{131} treated patients.

Metabolism and Nutrition Study Section

A symposium sponsored the previous year by the Study Section was published in July of 1957. Entitled "Interpretation of data obtained in studies with isotope-labeled proteins of biological significance", it was published in Federation Proceedings, Vol. 16, #2, pp. 1S-25S, (1957). The symposium was held in conjunction with the meeting of the Federation of American Societies for Experimental Biology in Atlantic City. In addition to pointing out the difficulties involved in these experiments, the symposium set up guidelines for evaluating data obtained in tagged protein studies.

A conference for "Insulin Activity in Blood and Tissue Fluids" was held in Bethesda this year. Twenty participants engaged in a panel discussion which was sponsored jointly with the Endocrinology Study Section. Its theme was presented by three members who had participated in an open symposium in Atlantic City in connection with the annual convention of the American Association for Clinical Investigation. About 300 physicians attended and the presentation was very well received.

The purpose of the conference was to determine the reliability of the several methods currently in use for the micro assay of insulin. Such methods are frequently mentioned in applications for research grants received by the two Study Sections involved, and it was thought worthwhile to have guidelines for the evaluation of such methods. Publication of the proceedings is anticipated.

The Study Section devoted a considerable time to the discussion of the status of nutrition as an independent science. It decided ultimately that the problem was such that it should promote its discussion and consideration by a national professional body. As a direct result, the American Institute of Nutrition will hold a symposium dealing with the general subject of the future of nutrition research at the spring 1958 Federation meeting in Philadelphia. Dr. Glen King will be Chairman.

Microbiology Study Section

With the appearance of an influenza pandemic in 1957, the Council of the NIAID urged support of an extramural program of influenza research. Since the last of August 1957, forty requests for grant support have been received from applicants in colleges and state health laboratories, asking for a total of $618,566 to support research in influenza. The Study Section reviewed half of these at its regular meeting in September and half at a special meeting on influenza held November 16, 1957. Of these requests, 13 have been approved and paid, totaling $187,347.

Special program interests of the Study Section include support of training grants in Microbiology. Several members of the Section will serve this coming year as a separate special ad hoc committee for the review of such grants.

Support for research on the widespread problem of staphylococcus infections in hospitals may require an inter-Study Section approach, according to the Executive Secretary, who plans to survey the interest in this matter during the coming year.

The Microbiology Study Section may divide into two Study Sections in 1958, because of the increase in the number of research grant applications to be reviewed. Tentative plans call for a Bacteriology and Mycology Study Section, and a Virus and Rickettsia Study Section. Although they regret the necessity of such a division, the membership considers that the quality of its review would suffer from any further increase in the current workload.

Dental Study Section

The calendar year 1957 has brought a substantial increase in the activities of the Dental Study Section. During the January meeting, 207 applications were reviewed. This is apparently the largest number ever to be handled at any one meeting of a Study Section. At the April and September meetings, the load went back to more normal figures, around 60. The percentage of approvals remained fairly constant in spite of these fluctuations in numbers of applications under consideration.

Certain administrative changes have been made; the most important one being the adoption of the method of sending out incoming applications to two referees as soon as possible. Before 1957, they had been collected into books which had been sent out about six weeks before the meeting. The modified method was received very favorably by the Study Section members since it spreads their workload more evenly and permits time to obtain additional information from applicants, if needed.

Increased attention has been paid to the question of radiation exposure in dentistry. A fair number of research projects deal with long-term roentgenographic studies of the development of oral structures and facial skeleton, and require repeated fluoroscopy or X-ray photography of children and adolescents. Information is now requested routinely from applicants on probable radiation doses received by the subjects during such studies, and on the measures taken for the protection of patient and operator.

A conference on Procedures for Estimating Caries Incidence and Increments is planned for late 1958; the preparations are being made by a subcommittee of the Study Section.

Mr. R. Donald Reed resigned as Executive Secretary in April 1957; he was succeeded on May 1st by Dr. Ulrich Weiss.

Hematology Study Section

The Hematology Study Section did not hold any conferences during the calendar year 1957; however, at the last meeting of the Study Section, it was decided to appoint a subcommittee for the purpose of organizing a conference on "Fundamental Problems of the Kinetics and Metabolism of Cellular Proliferation". This conference is being planned for January 1959.

Interest has been aroused in the development of a compound that could be used clinically in the treatment of hemophilia. The National Hemophilia Foundation recently held a meeting in which the Public Health Service was urged to take the initiative in the development of a program designed to obtain the antihemophilic factor. This will be brought to the attention of the Hematology Study Section at its meeting in January. Plans are in progress to have a subcommittee of the Study Section make a full study of this problem and present a report to the Public Health Service.

Physiology Study Section

The Physiology Study Section held a special work conference June 30-July 1 in Princeton, New Jersey, to discuss research and training needs in the field of Physiology. This discussion was continued at Iowa City at the September Study Section meeting and will be continued at subsequent Study Section meetings. From these discussions, specific recommendations to the various Councils are being formulated.

General Medicine Study Section

This newly organized General Medicine Study Section continued with the plans that originally developed at its first meeting and gave the responsibility of planning for a symposium on Ulcerative Colitis to Dr. Joseph Kirsner.

Support for the symposium which is planned for January 6, 1958, will come from an approved grant from the National Institute of Arthritis and Metabolic Diseases, supported through the Study Section's interests under the chairmanship of Dr. William Darby and from supplemental funds recently made available by the group that hopes to establish and charter a foundation for research on this subject, probably to be named the National Foundation for Research in Ulcerative Colitis with headquarters in Minneapolis, Minnesota.

Mental Health Study Section

During calendar year 1957, the Mental Health Study Section has sponsored no conferences, symposia or special events. A noteworthy item, however, was the formation of the Behavioral Sciences Study Section which drew some members from the Mental Health Study Section. The split was necessitated by the tremendous increase in workload over the last several years.

As a result of lengthy discussions during the past three meetings with Study Section members, it was determined that the Mental Health Study Section would concentrate primarily on applications dealing with mental health and illness per se, such as:

1. Clinical studies including psychosomatic research, psychological factors in non-psychiatric disorders, etc.
2. Evaluations of treatment methods
3. Rehabilitation studies
4. Biologic studies of mental illnesses
5. Clinical pshychopharmacologic studies
6. Epidemiology and biometrics
7. Most studies of "preventive" mental health programs, early treatment efforts, etc.

Behavioral Sciences Study Section

The Behavioral Sciences Study Section was established in April of this calendar year. This Study Section concentrates primarily upon applications dealing with the behavioral sciences other than those relating to mental illness per se:

1. Research on psychological test construction and validation
2. Comparative psychology (animal studies of learning, perception, etc.)
3. Physiological psychology (including animal and human studies of stress, emotion, etc.)
4. Perceptual processes, learning theory and application, motivation, etc.
5. Comparative psychopharmacology (pre-clinical animal testing)
6. Developmental psychology
7. Social psychology
8. Sociology

It should be noted that the division of applications between the Mental Health and Behavioral Sciences Study Sections is not a biological-social dichotomy, nor is it purely a clinical-non-clinical dichotomy, though superficially resembling both. This division seems to have more logic than either of these in terms of the competences proposed to be represented on each Section.

Nursing Research Study Section

The Nursing Research Study Section was formed in March 1957 and held its first meeting late in April. The function of this new Study Section is to review and make recommendations to the National Advisory Councils concerning research grant applications dealing with investigations that propose to study or assess nursing care, the organization, administration, or supervision of nursing services, nursing education, behaviors of nursing personnel in any setting, career dynamics in nursing occupations, nursing needs of patients or related problems, and to keep the Councils advised regarding research needs in the nursing field and related problems.

A committee of the Study Section was constituted to consider the need for nursing research conferences. This committee surveyed the need and reported back to the Study Section. It then was charged with responsibility for developing specific plans for two conferences which were regarded as of highest priority. Tentative plans for one of these conferences, a conference on training for nursing research, will be submitted to the Study Section in January 1958 for action.

A committee on special clinical training needs in cardiovascular nursing has been set up to take care of a request from the Heart Council for recommendations regarding this problem. This committee has planned a work conference for January 11, 1958, as preparation for formulating recommendations.

Sensory Diseases Study Section

A two-day Symposium on Visual Mechanisms was held on September 11-12, 1957, following the September Study Section meeting. Ten speakers presented papers which were received and discussed with great interest by an audience of 125 scientists. It is expected that papers will be published in the A.M.A. Archives of Ophthalmology in the near future.

No concrete plans for future symposia have been completed, but it is hoped by the Study Section that an otologic subject may be the purpose of the next conference.

Sanitary Engineering and Occupational Health Study Section

The Sanitary Engineering and Occupational Health Study Section is concerned with that branch of public health research which aims to improve the health and well being of man through control of the environment. The broad problem areas for research investigations in environmental health may be classified as follows: water pollution control, air pollution control, waste and refuse disposal, food technology, and occupational health. Special activities in these areas may be summarized as follows:

Water Pollution Control: During the past year, Public Health Service research grants have been made in the fields of water treatment, water supply, sewage and industrial wastes treatment, and stream sanitation. Specifically the types of proposals that have been submitted and recommended for activation include: (1) studies on biological indexes of pollution; (2) effects of pollution abatement practices on affected streams; (3) effects of pollution on marine areas and estuaries; (4) reappraisal of standard maximum density of coliform bacteria in sources of public water supplies; (5) basic study of the biological factors governing the assimilative capacities of receiving waters for non-toxic organic matter; (6) evaluation of natural purification by reaeration, photosynthesis and other factors; (7) establishment of reliable criteria for various usages of receiving water, especially dissolved oxygen levels necessary to the maintenance of all forms of aquatic life; (8) development of improved treatment processes in removing bacteria and organic wastes; (9) improved methods for determination of biochemical oxygen demand; (10) studies of capacities of various organisms in biological processes in waste stabilization.

It is gratifying to note that there has been an increase of 125 per cent in support of research in water pollution in 1957 over that of the year 1956.

Air Pollution: Air pollution research studies require the support of many fields of knowledge such as medicine, engineering, meteorology, chemistry, physiology, pathology, and epidemiology. Here again, as in the field of water pollution, the Study Section's work is greatly aided by the Bureau of State Services through its Community Air Pollution Program of the Division of Sanitary Engineering Services and by the Medical Air Pollution Program of the Division of Special Health Services. Thus, for example, both of these Divisions sponsored an Air Pollution Research Seminar during the past year at the Robert A. Taft Sanitary Engineering Center in Cincinnati. The seminar covered research planning relative to the agricultural, chemical and aerosol, engineering, instrumental, medical, and meteorological phases of air pollution research. Many PHS research grantees reported on their research progress and Study Section members, expert in the field of air pollution, participated in the discussions.

During the ten-year period, 1946-1956, 37 grants, which include 22 separate projects, have been supported in air pollution through recommendation of the SEOH Study Section and the National Advisory Council concerned. These awards have amounted to $770,129. This shows an average of only four grants per year made with an average annual support amounting to $77,000 during the ten-year period in this important field. Because of the recent increased interest of the Study Section and the Bureau of State Services, there is an encouraging factor to be noted in that 20 additional air pollution projects have been recommended for activation by the Section during 1957 alone, in the amount of $760,000.

Food Technology: One of the most neglected areas of research in the field of environmental health has been in the area of food technology. This is evidenced by the fact that in the ten-year period of the research grants program there have been relatively few proposals submitted. From 1946 to 1956, only 42 grants were awarded in the amount of $309,424.

In order to encourage research in food technology, the Executive Secretary discussed with the Director of the Robert A. Taft Sanitary Engineering Center the possibility of holding a Conference on Research Needs in this field. As a result, during this past year, there was assembled a highly qualified group of eleven milk and food consultants at the Center among whom was a newly appointed member of the Study Section. The Executive Secretary of the Study Section was invited to address the group on the PHS Research Grants Program in Environmental Health with Particular Reference to Research in Food Technology. The panel pointed out that there are many instances of foodborne disease outbreaks, the control of which has not been achieved by existing methods and services. New types of food, new materials, new processes, and new methods of food distribution have increased and created many potential public health hazards.

A report of the panel discussion was made to the Study Section by the Executive Secretary and the Section agreed that the following types of research need stimulation and should be within their scope of activities and consideration: (1) research to investigate the significance of various physical treatments of food by atomic radiation, high frequency radio waves, infrared rays or other high energy, short-time methods of processing that are intended to sterilize or pasteurize various products; (2) study of the ecological boundaries of survival and growth in foods of such important biological agents as Clostridium botulinum, Micrococcus pyogenes, and Salmonella typhi; (3) study of the complex chain of events from production to consumption of food in order to minimize the opportunities for contamination during growth, harvesting, slaughtering, processing, packaging, storage, transportation, marketing and preparation for serving; (4) epidemiological and toxicological investigations to provide a sound basis for establishing safe practices and acceptable standards of sanitary quality; (5) research on health effects of processes that alter the chemical structure of foods, such as the hydrogenation of fats, denaturation of proteins, degradation of carbohydrates, destruction of vitamins, or removal of trace elements. The growing importance of this field is evidenced in the substantial increase of applications submitted and approved for payment. In fact, support in food technology increased from $41,630 for four grants in 1956 to $154,000 for 15 grants in 1957, almost four-fold.

Occupational Health: Occupational health is concerned with the protection and preservation of the physical and mental health of persons gainfully employed. Activities in this field require support from a number of areas of knowledge including medicine, nursing, engineering, toxicology, physics, chemistry, biology, pathology, physiology, and epidemiology.

In proportion to its importance as a major area for research, there have been far too few applications submitted for the purpose of investigating the many problems needing solution. For example, during the ten-year period, 1946-1956, there were 41 grants made through the Study Section in the amount of $378,125. Due to recent activities and interest of the Study Section and the Bureau of State Services however, 12 grants were made during recent months (February 1956 through May 1957) amounting to about $230,000 or almost two-thirds of the total support given in the previous ten years.

The Section has been concerned with the small number and quality of proposals in occupational health and recognizes that the need for broadly trained scientists is basic, and that until this need can be met we can expect a dearth of proposals and not many of high quality. Rather than make specific recommendations to the Division of Research Grants to find ways and means to increase training programs in the many disciplines necessary to provide for personnel to go into teaching and research, the Section feels it should wait for some time to see what happens as a result of the recently enacted Public Law 911, "The Little Omnibus Bill". This provides for granting traineeships to physicians, engineers, nursing and certain other technical personnel in the field of occupational health.

General Research Grants Branch

The General Research Grants Branch corresponds to the Grants Branch of the categorical Institute. It guides and emphasizes those program areas not specifically covered by the categorical institutes. Dr. Dale R. Lindsay, in addition to serving as Assistant Chief of the Division, serves as Chief of the General Research Grants Branch. His branch administers the grants program in support of general research, presenting the applications to the National Advisory Health Council for evaluation and recommendation to the Surgeon General.

Within the broad scope of scientific inquiry supported by this branch are such fundamental research areas as fertility, reproduction, growth and development, genetics, endocrine physiology, biochemical effects of stress, embryology, and fetal physiology.

The following are examples of basic research areas which the Research Grants Branch has supported and brought into areas of categorical identification:

Electric Potentials of the Human Uterus: Grantees have succeeded in making a uterine electrical record of one complete labor, including delivery. This accomplishment of Dr. Sol D. Larks and his associates at the University of California is believed to be the first complete electrohysterogram of childbirth.

The electrical potentials of the human uterus in normal labor show a pattern of spikes and slow waves (or diphasic wave and slow wave pattern) synchronized with the uterine contraction and suggestive of the cardiac electrical complex in the low orders of animals with slow hearts. The duration of the complex shortens as labor progresses, and onset of rapid frequency signals early delivery. Mathematical analysis suggests the existence of a pacemaker, or possibly two pacemakers.

If this uterine electrical complex can be standardized, it will represent a major step in furthering our knowledge of uterine physiology and obstetrics. Studies such as this hold promise of providing the obstetrician with objective information to aid him in evaluation and diagnosis.

Metabolic Break-Through in Enigma of Psoriasis: A new finding points the way to the solution of the enigma of psoriasis, a skin disease afflicting at least 4,000,000 persons in this country. It has already yielded a quantitative and objective test which promises to be a valuable diagnostic tool for the dermatologist.

Physical and chemical studies on the scaly skin that characterizes many types of psoriasis have revealed abnormal physical and chemical properties that are consistently measurable. The abnormal physical properties are reflected in the slow rates at which certain fluids pass through a column of pulverized scales and in the decreased water-binding capacity of these scales. The chemical anomalies encountered in all psoriatic scales studied so far are: (1) a low free amino nitrogen content, and (2) a high sulfhydryl content. Both anomalies are limited to the water-soluble fraction of the scales and are not found in the normal surrounding skin. The consistent combination of these chemical features offers a potential means of diagnosing the disease. Additional refinements are yet to be made before this test can become a routine diagnostic procedure.

These research findings by grantees, Drs. Peter Flesch and Elizabeth C. Jackson, are particularly valuable in that they shift the focus of attention from an unsubstantiated deficiency in the pancreatic enzyme secretion to a localized protein defect in the lesions themselves.

Chemical Structure of a Pituitary Hormone Determined: In another study supported by this Branch, Dr. Choh Hao Li and his colleagues at the University of California have determined the chemical structure of intermedin, a pituitary hormone, as isolated from pork and beef pituitary glands. When injected into frogs, the hormone causes the skin melanocytes to expand. This, in turn, changes the skin color of the frog from a light green to a darker hue.

Although this discovery has no immediate clinical import (the function of intermedin in man is unknown), it is an achievement of fundamental scientific importance. The investigators now know that intermedin and corticotrophin, another pituitary hormone, have a common structural "core." If all of the anterior pituitary hormones are structurally related, as is suspected, Dr. Li's work can well be said to constitute an important advance toward the synthesis of all known pituitary hormones.

Electron Microscope Reveals New Patterns in Cell Structure: Electron microscope studies of animal cells have shed light on the mechanism by which the nucleus of a cell exercises control over the cytoplasm. Similar studies on plant cells suggest that the nuclear membrane of plant cells is fundamentally the same as that of animal cells, insofar as the structural pattern is concerned.

Previous research by grantees supported by the General Research Grants Branch and other scientists has shown that the nuclear membrane is a double-layered fenestrated envelope with raised ring-like structures surrounding "pore-like" areas. Recent studies by Dr. Helen Gay, a grantee at the Carnegie Institute of Washington, have revealed chromosomal material in the blebs or outpocketings of these pore-like areas which suggest a mechanism for extrusion of chromosomal material from the nucleus into the cytoplasm. This extruded gene-carrying material is believed to regulate the biosynthetic (building-up) activities of the living cell.

Similar studies at the same Institute by Dr. K. B. De on the staminate and pollen cells of the plant, *Tradescantia reflexa*, suggest that the nuclear membrane of both plant and animal cells is fundamentally the same with respect to its structural organization. The finding narrows the chasm that separates animal and plant life at the cellular level.

Near-Waste Product Promoted to Essential Member on Enzyme Team: Fundamental work on enzyme systems has shown that hypoxanthine, a nucleic acid derivative related to caffein and a precursor of uric acid in body metabolism, is a necessary component of the enzyme system by which the amino acid, cysteine, is oxidized to yield sulfate as one of its products.

Dr. Philip Handler, a grantee, has found that hypoxanthine is a hydrogen "transporter," taking hydrogen from the compound that is being oxidized and passing it on to diphosphopyridine nucleotide, another hydrogen transporter, or to the oxygen molecule itself. Hydrogen transporters are well known as necessary members of oxidative systems.

This is the first time a substance previously thought to be "on the way out" -- only two steps from the final waste product stage of uric acid itself -- has been identified as a necessary member of an enzyme team. The oxidation to sulfate of the sulfur in the sulfur-containing amino acids, cysteine and methionine, is the source of the sulfate found as a normal constituent in the blood and urine. This contribution to our knowledge of the basic mechanism by which the body incorporates elements into its tissues brings us closer to the core of many biological problems.

Sensitive Test Detects Diabetic Danger Signals: A new quantitative test, more sensitive than the one now commonly used, has been developed to measure the quantity of acetone bodies in blood and urine. The test is an offshoot of fundamental studies in the quantitative microdetermination of certain organic compounds. Basic studies by Russian Scientists in 1937 enabled Dr. Victor E. Levine and his associates at Creighton University School of Medicine to perfect this quantitative method.

The new test, which utilizes vanillin in an alkaline medium, offers many advantages over the widely used quantitative test of Behre and Benedict in which salicylaldehyde, also in alkaline medium, is used as the reagent. A major advantage of the grantees' method is found in the greater stability of vanillin solution over salicylaldehyde which deteriorates and discolors very rapidly.

Furthermore, in the Behre and Benedict test, the addition of the acetone brings about an increase in a color already present, whereas in the grantees' method the solution is colorless until the acetone is added. This difference between the two methods permits greater accuracy in the measurement of the acetone present.

Any increase in the acetone in the urine of a diabetic is a danger signal of possibly impending coma. In the diabetic child, development of ketosis and accompanying coma is the most serious hazard to his life. For this reason, clinicians urge diabetics to examine their urine frequently for acetonuria.

Factors Influencing Successful Skin Grafts: Studies on laboratory animals have shown that the immune mechanism of the host can be made more tolerant of skin grafts when living cells from the future donor are injected intravenously into the embryonic future host. At the University of California Medical Center, Dr. Jack Cannon, a grantee, is continuing these studies with emphasis on the many related factors that influence a successful "take" in skin grafting.

Dr. Cannon and his colleagues have perfected a technique which permits cross-transfusion of blood between embryo chicks with negligible mortality. Interchange of blood prior to hatching enables subsequent skin grafts to survive for longer periods of time than grafts in chicks receiving cross-transfusions after hatching. With this method approximately 40 percent of the 60 two-week-old chicks that were cross-transfused prenatally showed graft survival six months after grafting. In 89 untreated chicks, also two weeks old when grafting was performed, no grafts survived after five weeks. Upon cross-transfusion of blood shortly after hatching, skin grafts "took" initially in 40 percent of the chicks, but dropped to 2.5 percent by six months. It was further demonstrated in this study that the percentage of "take" increased when larger quantities of blood were transfused.

Studies of this kind are providing important data that will, it may be hoped, enable surgeons to achieve uniformly successful skin grafts and gain further insight into the many factors that must be considered for successful transplantation of human organs.

Bacterial Anti-Growth Factor Inhibits Fungus Growth: Lipoic acid, a non-metabolite known to inhibit metabolism in certain bacteria, was shown to retard growth of the watermold, *Allomyces macrogynus*. The finding is potentially useful in the control of fungi.

The specific inhibitory effect is on the "lag phase of growth," the early period of growth following inoculation of the mold into a culture medium. Data presented by Dr. Leonard Machlis of the University of California indicate that lipoic acid displaces glutamic acid, an amino acid (a building block of protein) essential in the metabolism of some fungi, bacteria, and insects.

The inability of certain bacteria to distinguish between essential nutrients and their corresponding antimetabolites is of growing importance in clinical medicine. For example, *p*-aminobenzoic acid (PAB) is required in the metabolism of certain streptococci. Sulfonamides, which are structurally related to PAB, successfully compete with it in the metabolism of these bacteria and thus inhibit their growth.

Congenital Anomalies Induced by Immunological Mechanisms: Nervous system abnormalities were induced in embryonic mice whose mothers were treated with mouse brain emulsions prior to pregnancy. These findings demonstrate that immunological mechanisms (maternal antibodies) act directly on the processes involved in the development of embryonic organs.

Dr. Salome Gluecksohn-Waelsch of the Albert Einstein College of Medicine injected normal female mice with emulsions of adult brain and then bred them through brother-sister matings. Abnormalities of the nervous system were found in a high percentage of embryos. These consisted of suppression of nervous tissue differentiation in the region of the brain and anterior spinal cord, microcephaly and abnormalities of closure of neural folds. As controls, siblings of brain-injected animals were injected with heart emulsion. None of the offspring showed any abnormality of the nervous system.

These findings support the hypothesis that immunological mechanisms (antigen-antibody reactions) may interfere with the normal development and differentiation of embryonic organs. This is one of several studies supported by the General Research Training Branch which are directed toward the solution of the problem of congenital anomalies. These account for 70,000 infants yearly so crippled by prenatal damage that they do not survive the first four weeks of life. Another 150,000 survive their prenatal or birth damage but remain handicapped throughout their lives.

Wood Constituent Found to Decrease Gastric Secretion: Preliminary studies with calcium lignin sulfonates from pulp mill sulphite waste liquor demonstrate that these compounds reduce gastric secretion and counteract experimental measures taken to produce gastric ulcers.

Screening tests by grantees to determine the gastric antisecretory activity of various compounds reveal that calcium lignin sulfonates afford considerable protection against laboratory-induced gastric ulcers in rats.

In a large screening operation, Dr. T. Lloyd Fletcher and his colleagues at the University of Washington School of Medicine, studied the effects of lignin sulfonate derivatives on gastric secretion in pylorous-ligated rats. Previous studies have shown that ligation of the pylorus produces gastric ulcers within 24 hours. Such rats treated with calcium lignin sulfonates were free from ulcers and had significantly less gastric secretion than the control rats. Although the tests are exploratory in nature, they are of fundamental importance, adding to our knowledge of gastric physiology and pointing the way to better treatment of peptic ulcer.

Annelid Eggs Highly Useful in Radiation Studies: Recent concern over diagnostic X-ray hazards and radiation fall-out resulting from nuclear detonations reemphasizes the importance of fundamental studies aimed to shed light on the effects of ionizing radiation on living systems.

One such study by Drs. Donald P. Costello and Catherine Henley of the University of North Carolina has demonstrated that the eggs of the marine annelid, Chaetoperus pergamentaceus, are highly suitable for study of the effects of irradiation on the early stages of development of this organism. Relatively low doses (255 r. to 765 r.) caused retardation of cell cleavage, ciliary defects, cytoplasmic blebs and feeble movements. Numerous abnormalities were also observed within the nuclear bodies that determine the hereditary pattern of the annelid. Somewhat higher doses (1020 r. and above) caused death in the larval stage.

Operations Branch

The Operations Branch continues as before to provide central control for housekeeping and management functions of the NIH research grants, training grants, research fellowships, and health research facilities grants program. Mr. Clarence A. Lowe remains as Chief.

Specifically, the central functions include the processing of research grant and fellowships applications, duplicating of the required copies for review purposes, payment of successful applications, administration of grant projects during their active life, development, and maintenance of records for all extramural programs, and finally, the auditing and closing of terminated grant projects. In addition, various units within the Branch are responsible for the day-to-day operation of the Division, such as mail and files, personnel recruitment, budgetary and financial planning, purchase and supply planning and procurement, Division travel requirements, space management, and custodial and maintenance responsibility.

The Duplicating Unit, in addition to accomplishing its originally planned function of providing multiple copies of extramural grant and award applications, further serves as the official NIH Class-A printing plant.

The objective of this branch is one of maximum production at a minimum of cost, and can be compared to an assembly line type of operation. Each of the many steps encountered between receipt of applications and final actions by the Advisory Councils and the Surgeon General, must be closely coordinated to eliminate the development of bottlenecks in the review and approval process.